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10/567,322

02/07/2006

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EXAMINER

CALANDRA, ANTHONY J

ART UNIT

PAPER NUMBER

4128

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/567,322	<b>Applicant(s)</b> BACKA ET AL.	
	<b>Examiner</b> ANTHONY J. CALANDRA	<b>Art Unit</b> 4128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 2<sup>nd</sup> February 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

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***Detailed Office Action***

1. The communication dated 2/07/2006 has been entered and fully considered.
2. Claims 1-9 are currently pending.

***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claim 1-6 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Applicants invention controls an amount of at least one delignification chemical based on the temperature change between two locations. The temperature change is related to the amount of heat released due to the reaction of a mass of lignin in the pulp with quantity of oxygen. However, the actual temperature change is highly dependent on the consistency of the system and the current method steps do not account for the consistency variable. At low consistency, the higher water content will absorb more heat making the temperature change lower and causing an overcharge of delignification chemical. At a high consistency, the lower water content will absorb less heat making the temperature change higher and causing an undercharge of delignification chemical.

Assume at 12% consistency 100 grams of pulp the temperature rise is 5 degrees C.

12% C, 100 grams pulp, 733 grams water

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heat = mass \* heat capacity \* temperature change,

heat = 833 grams total \* 4.2 J/g deg C \* 5 deg C

heat = 17,493 joules

At 8% C, 100 grams pulp, 1150 grams water

Same mass of pulp thus heat release is constant at 17,493 joules

17,493 Joules = 1250 grams total \* 4.2 J/g deg C \* delta T

Delta T = 3.3 deg C

As shown above a small difference in consistency can cause a large fluctuation in temperature difference which is not accounted for in the instant method steps in the claims or specification, nor does the instant application state that the consistency for the process must be kept constant.

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Claims 2-6 are dependent on claim 1.

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

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1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
7. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent # 5,916,415 MILLER, hereinafter MILLER, in view of, U.S. Patent # 5,306,391 CIRCUCCI et al., CIRCUCCI et al. and of U.S. Patent # 4,162,933 SHERMAN et al.

As for claim 1, MILLER et al. discloses a method for the oxygen gas delignification of cellulose pulp in a gas/fluid suspension in which oxygen gas delignification takes place in a reactor system with oxygen gas reactors [see e.g. abstract and figure 1].

MILLER discloses providing a sufficient amount of oxygen gas to the system (*providing delignification chemicals in such a quantity that oxygen gas remains present during a complete reaction process in the oxygen gas reactor* [see e.g. column 2 line 67]).

MILLER further discloses keeping the pH of the slurry at no less than 11.0 (*together with the oxygen gas, providing alkali at an amount that ensures that a pH value in the oxygen gas reactor remains over 9; adding the oxygen as and alkali upstream of the oxygen gas reactor*[see e.g. abstract and column 2 lines 65 to 66]).

MILLER does not explicitly disclose measuring the temperature of the pulp at two locations (*measuring a temperature of the cellulose pulp at a start of the oxygen gas delignification at two different locations*). However, MILLER does show the system with two steam headers for raising the temperature of the pulp before going to the next reactor [see e.g. Figure 1 (34) and (36)]. Each steam header would require a temperature sensor

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downstream of the steam header to control the steam flow. A temperature sensor after a steam addition, to control temperature is taught in CIRCUCCHI et al. (Figure 4 or 5). At the time of the invention it would have been obvious to a person of ordinary skill in the art to have a temperature sensor after a steam addition point MILLER as shown in CIRCUCCHI et al. A person of ordinary skill in the art would be motivated to have use such a sensor as to control the steam flow through the steam addition point and thus control the temperature after the steam addition [see e.g. CIRCUCCHI et al. Figure 4 or Figure 5].

MILLER does not disclose how the delignification chemicals are controlled. CIRCUCCHI et al. discloses controlling the oxygen based on the mass flow of the pulp determined by two different temperatures [see e.g. column 7 lines 10-30]. Neither, MILLER or CIRCUCCHI et al. disclose measuring a heat difference to control chemical charges. SHERMAN et al. discloses a method in which the degree of delignification is measured (and therefore chemical consumption), by measuring the difference in temperature between two points. The difference in temperature is the exotherm of the reaction [see e.g. abstract and column 3 lines 10-30]. While SHERMAN discusses kraft cooking and MILLER and CIRCUCCHI et al. discuss oxygen delignification, all three process deal with delignification and controlling of said process and thus are analogous art. SHERMAN further discloses that the computer which receives this data controls the flow of chemicals (which cause the delignification) to the digester. Further, SHERMAN et al discloses the amount of cellulose fed to the reactor based on the exotherm. By changing the cellulose amount SHERMAN has the effect of increasing the chemicals to the digester *(to determine an initial consumption of delignification chemicals that have*

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*reacted in a fluid phase, using the determined initial consumption of delignification chemicals to control or adjust an amount of at least one delignification chemical charged to the oxygen gas delignification reducing or increasing an amount of delignification chemicals charged while at the same time ensuring a presence of delignification chemicals during the complete reaction process [see e.g. column 6 lines 15-50]).*

At the time of the invention it would have been obvious to a person of ordinary skill in the art to combine the exotherm/temperature rise control method for digesters with the oxygen delignification system of MILLER and CIRCUCCI et al. A person of ordinary skill in the art could reasonably expect success of applying a known technique for controlling digester delignification systems using temperature changes caused by exotherm for controlling oxygen delignification systems as both systems show an exothermic temperature increase due to the delignification of the lignocelluloses within.

As for claim 2, MILLER discloses that the first reactor has a reaction time of 5 to 10 minutes [see e.g. Abstract]. Miller further discloses that the mixers have a retention time of 1 second to 5 minutes [see e.g. column 2 lines 45-46]. The total time between the two temperature sensors of MILLER would be the time in the number 1 reactor (5-10 minutes), plus the time in the number 2 mixer (1 second to 5 minutes), plus any time in the piping. The total time between the two temperature sensors is about 5 to 15 minutes which falls within the instant claimed range of 10 seconds to 30 minutes. Examiner notes that the time the pulp spends in the pipe is negligible.

As for claim 3, as discussed in claim 1, the 1st temperature sensor in MILLER/CIRCUCCI et al. combination would be located after steam addition (34) which is after mixer (18) which is after the addition of oxygen gas (16) [see e.g. Figure 1].

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As for claim 4, MILLER does not disclose a temperature sensor before the addition of oxygen gas (16). MILLER/ CIRCUCCI et al. does disclose a temperature sensor after the oxygen sensor. Reversing the order of oxygen addition is *prima facie* obvious. It is the position of the examiner, that without evidence to the contrary that the order of the addition of oxygen will not effect the process. The order of addition of ingredients has been found to not necessarily be non-obvious [see e.g. MPEP 2144.04 (IV) (B)].

As for claim 5, SHERMAN et al. discloses that the rate of magnitude of rise of the temperature is measured and used to control delignification [see e.g. column 3 lines 15-20]. The rise of the temperature is equivalent to the derivative of temperature [ $y = mx + b$ , where  $m$  is the rise or slope,  $y'$ , the derivative,  $= m$  or the slope itself]. SHERMAN et al. states that the correct flow of chemicals is determined and controlled by the computer [see e.g. column 6 lines 21-22].

8. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent # 5,916,415 MILLER, hereinafter MILLER, in view of, U.S. Patent # 5,306,391 CIRCUCCI et al., CIRCUCCI et al. and of U.S. Patent # 4,162,933 SHERMAN et al. as applied to claim 1-5 above, and further in view of Handbook For Pulp and Paper Technologists by SMOOK, hereinafter SMOOK.

In regards to claim 6, MILLER discloses an oxygen delignification process while CIRCUCCI et al. teaches controlling the flow of chemicals. SHERMAN et al. teaches that pulp delignification process can be controlled using exothermic changes in temperature. MILLER, CIRCUCCI et al. and SHERMAN et al. do not teach trending the oxygen gas and using said trend to control the amount of at least one delignification



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chemical. SMOOK teaches the use of supervisory digital control [see e.g. pg 360]. This control system allows a picture of the current status of process variables which the examiner has interpreted as a trend. Further, SMOOK teaches that the supervisory control periodically calculates set points for controllers based on inputs to it [see e.g. pg. 360]. At the time of the invention it would have been obvious to a person of ordinary skill in the art to trend the temperature data and oxygen data of MILLER, CIRCUCCHI et al. and SHERMAN et al. using the supervisory control of SMOOK. It would have further been obvious to allow the supervisory control system of SMOOK to take these data inputs and make set points for the controllers to control the flow of delignification chemicals. A person of ordinary skill in the art would be motivated to combine these inventions to obtain an optimum value for selected values (such as minimum oxygen flow) and not have to do such calculations by hand [see e.g. pg. 360-361].

9. Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent # 5,916,415 MILLER, hereinafter MILLER, in view of WIPO publication WO 01/02641 DAHLLOF et al. and U.S. Patent # 5,306,391 CIRCUCCHI et al., CIRCUCCHI et al.

As for claim 7, MILLER discloses a system for an oxygen gas delignification of cellulose pulp in a gas/fluid suspension in which the oxygen gas delignification takes place in a reactor system [see e.g. abstract].

MILLER teaches two pressurized reactors which contain delignification chemicals (*an oxygen gas reactor having delignification chemicals contained therein* [see e.g. Figure 1]). MILLER further teaches a location for adding the alkali NaOH (*an alkali*

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*addition location for adding alkali to the system* [see e.g. Figure 1 (14) and (22)]. The alkali additions are clearly upstream of there respective reactors (*the alkali addition location being upstream of the oxygen gas reactor* [see e.g. Figure 1]). MILLER shows the location for adding oxygen and NaOH which are both delignification chemicals (*a delignification chemicals addition location for adding delignification chemicals to the system* [see e.g. Figure 1]). Both the oxygen and NaOH additions are clearly upstream of the reactor (*the delignification chemicals addition location being upstream of the oxygen gas reactor* [see e.g. Figure 1]).

MILLER does not go into detail of the location of temperature sensors or control vales. However, MILLER does show the system with two steam headers for raising the temperature of the pulp before going to the next reactor [see e.g. Figure 1 (34) and (36)]. Each steam header would require a temperature sensor downstream of the steam header to control the steam flow. A temperature sensor after a steam addition, to control temperature is taught in both DAHLLOF et al. (Cover Figure) and in CIRCUCCI et al. (Figure 4 or 5). At the time of the invention it would have been obvious to a person of ordinary skill in the art to have a temperature sensor after a steam addition point MILLER as shown in either DAHLOFF et al or CIRCUCCI et al. A person of ordinary skill in the art would be motivated to have such a sensor as to control the steam flow through the steam addition point and thus control the temperature after the steam addition [see e.g. DAHLOFF et al. cover figure or CIRCUCCI et al. Figure 4 or Figure 5].

Therefore, the first temperature sensor would be located adjacent to the chemical addition if after steam addition location of MILLER (*a first temperature sensor located adjacent to the delignification chemicals addition location* [see e.g. Figure 1 (34)]). The

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second temperature sensor would be the temperature sensor located after the second chemical mixing area and is downstream of the first reactor (*a second temperature sensor located in the reactor system downstream of the first temperature sensor* [see e.g. Figure 1 (36)]). Alternatively to the second temperature sensor could be a temperature sensor located on the top of the reactor as seen in [see e.g. DAHLOFF et al. cover figure]. At the time of the invention this Both the upstream or downstream temperature sensors are able to control steam flow and are thus connected to a DCS, or digital control system, which is a system used in pulp mills to control valves and monitor temperature (*the first and second temperature sensors being electrically connected to a control unit;*).

MILLER does not show control vales being connected to delignification chemicals such as oxygen or NaOH. However, control valves connected to a DCS system are commonplace and clearly obvious for a pulp mill. CIRCUCCI et al. shows that oxygen flow control is controlled by a control valve. The temperature sensor is both connected electrically connected to the O2 control valve and a steam valve [see e.g. Figure 4 and Figure 5]. Further, once an input from a sensor is sent to a DCS would be capable of controlling any control valve (*control unit being electrically connected to a control valve; and the control valve being in operative engagement with a delignification chemicals supply to control a flow of delignification chemicals to the delignification chemicals addition location*). At the time of the invention it would have been obvious to a person of ordinary skill in the art to have a control valve on the oxygen line or NaOH line. A person of ordinary skill in the art would be motivated to have a control valve as this allows the flow, pressure of chemicals to be regulated remotely [see e.g. CIRCUCCI figure 4 and 5], shut-down chemicals remotely and is used in all modern pulp mills.

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As for claim 8, as taught above the combination of MILLER and CIRCUCCI et al. teach that a temperature sensor is located after steam location (34) which is downstream of mixer (18) where the oxygen and caustic delignification chemical are mixed.

As for claim 9, MILLER does not disclose or infer a temperature sensor upstream of a chemical addition location. CIRCUCCI et al. discloses a temperature sensor upstream of where the steam and oxygen (a delignification chemical) are added (55) [see e.g. Figure 4 sensor 29]. This sensor is used to control the pressure of the steam by means of a signal processor as to measure the flow rate of pulp and thus control oxygen flow {see e.g. column 7 lines 10-30}. At the time of the invention it would have been obvious to a person of ordinary skill in the art to place a temperature sensor before the chemical and steam addition of MILLER similar to CIRCUCCI et al. A person of ordinary skill in the art would be motivated to add the second sensor as to control the oxygen dosage [see e.g. column 7 lines 28-30].

### ***Conclusion***

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANTHONY J. CALANDRA whose telephone number is (571)270-5124. The examiner can normally be reached on Monday through Friday, 7:30 AM-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Barbara Gilliam can be reached on (571) 272-1330. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Barbara L. Gilliam/  
Supervisory Patent Examiner, Art Unit  
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AJC